

WHAT IS CLAIMED IS:

1. A system for detecting misfire for an internal combustion engine having an ignition plug, installed to face into a combustion chamber of a cylinder of the engine and connected to an ignition coil, which produces spark discharge when
5 supplied with discharge current from the ignition coil to ignite air-fuel mixture in the combustion chamber; comprising:

a current detection circuit which detects ionization current, that flows following the discharge current, during a period;

10 a misfire detector which detects occurrence of misfire of the engine based on the detected current; and

a processing delay circuit which inputs at least one of the discharge current and the ionization current and based on the inputted current, delays starting of the period by a time point which is not earlier than termination of the discharge current.

15 2. A system according to claim 1, wherein the processing delay circuit includes;

a comparator which inputs the current to compares with a reference value and produces an output indicative of at least starting of the period, and

20 a capacitor provided before the comparator which delays inputting of the current to the comparator such that the starting of the period is delayed by the time.

25 3. A system according to claim 1, wherein the processing delay circuit includes;

a comparator which inputs the current to compares with a reference value and produces an output indicative of at least starting of the period, and

a reference value supply circuit which varies the reference value to delay producing of the output of the comparator such that the starting of the period is delayed by the time.

5

4. A system according to claim 2, wherein the comparator inputs the ionization current and produces the output indicative of the starting and ending of the period.

10

5. A system according to claim 3, further including:

a comparator which inputs the ionization current to be compared with a reference value and produces the output indicative of the starting and ending of the period.

15

6. A system according to claim 2, wherein the comparator inputs the discharge current and produces the output indicative of the starting of the period.

20

7. A system according to claim 3, wherein the comparator inputs the discharge current and produces the output indicative of the starting of the period.

25

8. A system according to claim 1, wherein the current detection circuit includes an integration capacitor to be charged by the ionization current, and the misfire detector detects the occurrence of misfire of the engine based on an output of the integration capacitor.

9. A system for detecting misfire for an internal combustion engine having an ignition plug, installed to face into a combustion chamber of a cylinder of the engine and connected to an ignition coil, which produces a discharge spark when supplied with discharge current from the ignition coil to ignite air-fuel mixture in the combustion chamber; comprising:

a current detection circuit which detects ionization current, that flows following the discharge current, during a period;

a misfire detector which detects occurrence of misfire of the engine based on the detected current; and

a processing delay circuit which inputs the ionization current and based on the inputted ionization current, delays starting of the period by a time after the ionization current begins to flow.

10. A system according to claim 9, wherein the processing delay circuit includes;

a comparator which inputs the ionization current to compares with a reference value and produces an output indicative of the starting and ending of the period, and

a capacitor provided before the comparator which delays inputting of the current to the comparator such that the starting of the period is delayed by the time.

11. A system according to claim 9, wherein the processing delay circuit includes;

a comparator which inputs the current to compares with a reference value and produces an output indicative of the starting and ending of the period, and

a reference value supply circuit which varies the reference value to delay producing of the output of the comparator such that the starting of the period is delayed by the time.

5

12. A system according to claim 9, wherein the current detection circuit includes an integration capacitor to be charged by the ionization current, and the misfire detector detects the occurrence of misfire of the engine based on an output of the integration capacitor.

10

13. A system for detecting misfire for an internal combustion engine having an ignition plug, installed to face into a combustion chamber of a cylinder of the engine and connected to an ignition coil, which produces a discharge spark when supplied with discharge current from the ignition coil to ignite air-fuel mixture in the combustion chamber; comprising:

15

a current detection circuit which detects ionization current, that flows following the discharge current, during a period;

20

a misfire detector which detects occurrence of misfire of the engine based on the detected current; and

a processing delay circuit which inputs the discharge current and based on the inputted current, delays starting of the period by a time after the discharge current cease to flow.

25

14. A system according to claim 13, wherein the processing delay circuit includes;

a comparator which inputs the discharge current to compares with a reference value and produces an output indicative of the starting of the period, and

a capacitor provided before the comparator which delays inputting of the current to the comparator such that the starting of the period is delayed by the time.

5 15. A system according to claim 13, wherein the processing delay circuit includes;

 a comparator which inputs the current to compares with a reference value and produces an output indicative of the starting of the period, and

 a reference value supply circuit which varies the reference value to delay
10 producing of the output of the comparator such that the starting of the period is delayed by the time.

 16. A system according to claim 13, wherein the current detection circuit
15 includes an integration capacitor to be charged by the ionization current, and the misfire detector detects the occurrence of misfire of the engine based on an output of the integration capacitor.

20 17. A method of detecting misfire for an internal combustion engine having an ignition plug, installed to face into a combustion chamber of a cylinder of the engine and connected to an ignition coil, which produces spark discharge when supplied with discharge current from the ignition coil to ignite air-fuel mixture in the combustion chamber; comprising the steps of:

25 (a) detecting ionization current, that flows following the discharge current, during a period;

 (b) detecting occurrence of misfire of the engine based on the detected current; and

(c) inputting at least one of the discharge current and the ionization current and based on the inputted current, delaying starting of the period by a time point which is not earlier than termination of the discharge current.

5

18. A method according to claim 17, wherein the step (c) inputs the ionization current and delays the period by the time since the ionization current begins to flow.

10

19. A method according to claim 18, wherein the step (c) determines the period based on flow of the ionization current.

15

20. A method according to claim 17, wherein the step (c) inputs the discharge current and delays the period by a time since the discharge current terminates to flow.